BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PATENT SPECIFICATION

DRAWINGS ATTACHED

875,691

Date of Application and filing Complete Specification: July 15, 1958.
No. 22732/58.
Application made in Switzerland on July 16, 1957.
Application made in Switzerland on Oct. 17, 1957.
Complete Specification Published: Aug. 23, 1961.

Index at acceptance:—Classes 79(3), A2(C9: E); 79(1), E1(A: B: C: F); 79(2), C(4: 8: 10F: 16: 18C); 79(5), H9C; and 108(2), D(2A2E: 6E: 6I3).

International Classification:—B62d.

COMPLETE SPECIFICATION

Improvements in or relating to Motor-Driven Vehicles

I, ERNST MEILI, a Swiss citizen of Hochstrasse 129, Schaffhausen, Switzerland, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns motor vehicles and has for its object the provision of a vehicle construction which is adaptable for travelling over different surfaces and which is particularly suitable for a cross-country vehicle required to travel over uneven terrain.

According to this invention, there is provided a motor driven vehicle comprising a wheeled front section and a wheeled rear section, such sections being so coupled to a horizontal wheeled axle arranged intermediate the section, or to a central section embodying at least one horizontal wheeled axle, that the angle between the longitudinal axes of the front and rear sections may be varied, and hydraulically operable means arranged to effect adjustment of the angular positions of the front and rear sections relatively to one another and to lock such sections in any of a range of adjusted relative angular positions or to allow them to be freely movable relatively to one another.

Preferably, the vehicle comprises front and rear sections each coupled to a central section for pivoting about a horizontal axis and thus, according to a further aspect of this invention, there is provided a motor driven vehicle comprising a central section which embodies at least one wheeled horizontal axle, wheeled front and rear sections each coupled to said central section for pivoting about a horizontal axis, and hydraulic means operatively connected to the front and rear sections and operable selectively and positively to adjust angularly the front and rear sections relatively to each other and to lock such sections in any desired adjusted position or to allow them to be freely movable.

[Price

The vehicle according to this invention may take a great variety of forms and for any given application that form may be chosen which has particular advantages for such application.

A number of such different forms of the vehicle according to this invention are shown, only the members directly necessary for the understanding of the invention being indicated in the attached drawings in which:—

Figure 1 is a side view of a first embodiment;

Figure 2 is a plan view of the embodiment of Figure 1;

Figure 3 is a side view of a second embodiment;

Figure 4 is a plan view thereof;

Figure 5 is a side view of a third embodiment;

Figure 6 is a plan view thereof;

Figure 7 is a further side view of the third embodiment, but showing the latter in another operative position;

Figure 8 is a side view of a fourth embodiment;

Figure 9 is a plan view thereof;

Figure 10 is a further side view of the fourth embodiment, but showing the latter in another operative position;

Figure 11 is a side view of a fifth embodiment;

Figure 12 is a side view of a sixth embodiment;

Figure 13 is an inverted plan view of the embodiment of Figure 12;

Figure 14 is a side view of a seventh embodiment;

Figure 15 is a plan view thereof;

Figure 16 is an elevation of an eighth embodiment;

Figure 17 is a plan view thereof;

Figure 18 is a side view of a ninth embodiment;

Figure 19 is a plan view of the same embodiment showing particularly the hydraulic

Price

connections and control members;

Figure 20 is a fragmentary view of the embodiment of Figure 18;

Figures 21*a* and 21*b* are diagrammatic views showing the embodiment of Figure 18 in two stages of movement when scaling a wall;

Figure 22 is a view showing the embodiment of Figure 18 when used on sloping ground;

Figure 23 is a diagrammatic plan view of the vehicle of Figure 18 showing the directions of wheel movements during moving of the vehicle in its turning circle.

Figure 24 is a side view of an eleventh embodiment; and

Figure 26 shows a last embodiment suitable particularly for military purposes.

Referring to Figure 1, there is there illustrated diagrammatically the wheel arrangement of a cross-country vehicle, the body not being shown. This vehicle comprises a wheel unit 1 rigidly attached at the centre of the frame or chassis of the vehicle. The wheel unit 1 accommodates gear for transmitting engine drive to a horizontal centre axle 2 rigidly supported by the wheel unit and carrying wheels 3, such gear being symbolically indicated by a pinion 4. The vehicle is further equipped with a pair of front wheels 5 and a pair of rear wheels 6 attached respectively to swivel arms 7 and 8 which can be swivelled about horizontal axes upwardly or downwardly in vertical planes relatively to the wheel unit 1 on pivots 9 and 10. The reference numbers 5 and 6 designate the wheels in their uppermost position whilst the reference numerals 5^1 and 6^1 designate the wheels in their lowermost position. For normal travel on a flat surface, all six wheels may rest on the ground, this position being indicated at 5^{11} and 6^{11}. The pivoting of the arms 7 and 8 is effected by hydraulically operable means as will become apparent hereafter and the arrangement is such that the arms may be locked in any desired adjusted position or allowed to move freely. The rear and/or front wheels may be disengageably connected to the gear 4, the swivel arms 7 and 8 being designed for the transmission of the rotary drive through pivots 9 and 10, as by a chain drive.

A hydraulic power plant is provided for the active drive of the front and rear wheels from the interior of the vehicle. This power plant is preferably controlled from the driver's seat by means of suitable control members. The design of such plant is described hereinafter. The power plant may, alternatively, be of pneumatic or purely mechanical type (e.g. using a shaft drive direct from the engine). The angular adjustment of the arms 7 and 8 in such case would, however, be effected by hydraulically operable means. Figure 2 is a diagrammatic plan of the arrangement of the front and rear wheels 5 and 6, the swivel arms 7 and 8, the pivots 9 and 10 and the transmission of the drive. As shown, the wheels 3 on the centre axle may be twin wheels. It will be appreciated that the vehicle of Figures 1 and 2 comprises three sections, a central section including the wheel unit 1 and axle 2, a front section including the arms 7 and wheels 5 and a rear section including the arms 8 and wheels 6.

In the embodiment illustrated in Figures 3 and 4 only the centre axle 2 with the two centre twin wheels 3 and the pinion 4 is shown of the central section. Directly pivoted to the centre axle 2 are front and rear sections comprising swivel arms 11 and 12 the outer ends of which each carry a small frame or auxiliary unit 14 swivelling on a pivot 13 and carrying wheels 15, 16, 17 and 18. The arrangement of the swivel arms, which also transmit the drive, and of the frames is shown in the plan view of Figure 4. With this arrangement a correspondingly smaller wheel pressure is obtained than with the embodiment of Figures 1 and 2. Each pivot 13 can be swivelled upwardly and downwardly by means of the associated swivel arm from the interior of the vehicle and the frame 14 arranged on such pivot can swivel freely thereon.

In order to be capable of taking greater loads, the rear wheels 17 and 18 may be designed as twin wheels as shown in chain-dotted lines at 17*a* and 18*a*. As in the first embodiment, the front wheels 15 are swivellable about pivotal points 19 and connected with the steering wheel *via* a conventional linkage for the purpose of steering the vehicle. In order to render steering easier, the swivel arms 12 may be slightly raised so that all the rear wheels are relieved. Similarly, in addition to the wheels 15 being pivotal at points 19, the wheels 16 may be pivoted, as shown at 20, for the purpose of steering.

The embodiment shown in Figures 5 to 7 is distinguished from that of Figures 3 and 4 only in that the front swivel arms, here indicated by the reference 11*a*, are pivoted not directly to the centre axle 2 but to the central section of the vehicle by means of a separate auxiliary axle 21 through which the drive is transmitted from the centre axle as shown in Figure 6. This facilitates the design of the centre axle and of its suspension.

Figure 7 shows how the vehicle can pass over an obstacle consisting of a pronounced step 22 and a fence or the like 23. The auxiliary wheel units 14 may be actively swivelled about their pivots by hydraulic means.

Figures 8 to 10 show a further embodiment equipped with the same number of wheels as that of Figures 5 to 7, but in this embodiment the wheels 16 are replaced by wheels 30 directly swivelled to the centre axle 2 *via* additional swivel arms 31. This construction renders approximately the same uses possible as the embodiment just described, but

it possesses the advantage of simpler control by raising and relieving the wheels 30. Also the wheels 30 can be swivelled through a larger angle and more independently of one another. In addition, the wheels 15, 30 and 3 can be arranged as shown to run on separate tracks when the vehicle is driven straight ahead, thereby improving adhesion of these wheels to the ground with a corresponding increase of the tractive power of the vehicle.

Figure 10 shows how a comparatively high obstacle 33 may be overcome by the vehicle of this construction, the rear swivel arms 12 being first raised to the height of the obstacle and the wheels 30 subsequently lowered by means of the swivel arms 31 so that at least three pairs of driving wheels are in contact with the ground.

Figures 11 to 13 show a further embodiment and modification thereof, of the vehicle possessing two separate frame halves 40 and 41 which form respectively the front and rear sections of the vehicle and are swivelled to the centre wheel axle 2 which is attached to the wheel unit 1. This unit 1 can be rigidly attached to the rear or front frame half or to be integral therewith. The front and rear wheels are supported in the two frame halves and their swivelling movements are again hydraulically controllable from the driver's seat.

As shown in Figure 11 pivots 42 and 43 are rigidly attached to the frame halves and carry wheel units 44 and 45 in which wheels 46, 47, 48 and 49 are arranged. At least individual wheels can be connected to the vehicle drive; a driving engine may be accommodated in each frame half. At least two front pairs of wheels 46 and 47 are steerable, steering being facilitated by relieving the rear frame half 41 by raising the latter. For this purpose the front frame half 40 has a greater weight in operation in respect of dead weight and service load than the rear half. As shown in Figure 11 this vehicle, too, is capable of overcoming obstacles. By providing inclined surfaces 50, the frame halves may also be swivelled towards one another in the upward direction so that upwardly directed surface irregularities can be surmounted with ease. These may be formed by deep trenches or obstacles of slight depth in the direction of travel.

Figures 12 and 13 show a modification in which each frame half, in this case represented by the references 51 and 52, carries one pair of wheels 53 and 54 respectively. The successive wheels are interconnected by means of endless tracks 55 and 56 respectively so that cross-country mobility is ensured by the swivelling of frame halves 51 and 52 relatively to one another, and by the said tracks. The centre wheel unit 1 incorporates the drive and can be swivelled relative to the frame half 51 by means of two hydraulic pressure and traction cylinders 57 which are connected to pivot arms 58. The wheel unit 1, together with the two pivot arms 58 is rigidly connected with the rear frame half 52. Steering is effected in the usual manner by braking one track whilst the rear frame half is raised.

In the embodiment of Figures 14 and 15, the rigid centre wheel unit 1 is provided with two centre axles 2 and 2*a* the front axle 2 being driven *via* pinion 4 whilst the rear axle 2*a* is rotatably connected therewith by endless tracks 60. These tracks pass around centre wheels 3 and 3*a*. Associated with the centre wheel unit are two front wheels 61 and two rear wheels 62 which can be individually raised and lowered by means of swivel arms 63 and 64 respectively. The swivel arms are pivoted directly to the centre axles 2 and 2*a* and may again be designed to transmit the drive to the single front and rear wheels. Provided inside the frame 1 may be a further transmission 65 from the axle 2 to axle 2*a*. Steering by the front wheels 61 may be assisted by simultaneous braking of the corresponding track 60 and by raising of the rear wheels 62. The vehicle body 66 may be raised above the tracks and be continuous, corresponding lateral recesses being provided for the front and rear wheels. It may, however, also be subdivided into two halves swivellable relative to one another, as in the embodiment of Figures 12 and 13.

The embodiment of Figures 16 and 17 differs from that of Figures 14 and 15 in that the two centre axles 2 and 2*a* of the rigid wheel unit 1 are not interconnected by endless tracks, but carry normal driving wheels 3 and 3*a*. Again arranged on swivel arms 63 and 64 are front and rear wheels 61 and 62 individually swivellable, hydraulic pressure and traction cylinders 67 and 68 being connected to the vehicle body 66 and their pistons 69 and 70 to pivots 71 and 72 rigidly attached to the associated swivel arms. The drive transmission members, e.g. chains, for the front and rear wheels are accommodated in the swivel arms 63 and 64.

In addition, one of several wheels may be arranged so as to be vertically movable in the central vehicle plane and, if necessary, driven.

In the embodiment shown in Figures 18 to 20, the driving and steering means of the vehicle and the driving and control members for the hydraulic power plant for moving individual wheels are shown in greater detail.

The vehicle illustrated is provided with raised chassis 101 in which a driving engine 102 and a horizontal axle 103 for the centre wheels are rigidly arranged. The axle 103 is connected to the engine 102 *via* differential gear 104. The reference numeral 105 designates the front wheels, 106 the centre wheels and 107 the rear wheels. The front wheels 105 are arranged on floating twin axles 108 so as to be swivellable in the vertical direction

through a relatively large angle. Furthermore, they are connected, by half axles 109, with a front differential gear 110 through which they are driven by differential gear 104 *via* transmitting members accommodated in a box 111. The front wheels are steerable by a steering wheel 112 *via* a linkage (not shown).

The rear wheels are supported on swivel arms 113 which can be individually raised or lowered about the axle 103 of the centre wheels 106, as shown in chain-dotted lines in Figure 18. Also arranged in the swivel arms 113 is a drive transmission (e.g. a chain transmission) through which each rear wheel is rigidly connected for rotary movement with the corresponding centre wheel.

The vehicle is provided with a hydraulic power plant which comprises a tank 120 for the hydraulic medium, in the present case hydraulic oil, two oil pumps 121, two control valves 122 and 123, various pressure cylinders, pressure lines and stop valves. The two oil pumps are continuously driven by the driving engine 102 and, while the engine is running, circulate the oil continuously through the hydraulic system. The rear wheel arms 113 have associated therewith pressure cylinders 124 and 125 connected to the oil pumps 121 *via* the control valves 122 and 123, and the two lines 126 and 127 and 128 and 129 respectively. As shown by the diagrammatic view of the system in Figure 19, the control valve 122 is designed to actuate the left-hand pressure cylinder 124 so that, depending on the movement of a control lever 122*a*, it will positively force out or pull in a pressure piston 124*a*. The control valve 123 analogously actuates the right-hand pressure cylinder 125 with its pressure piston 125*a*. As seen in Figure 18, the pressure pistons 124*a* and 125*a* are pivotally mounted on levers 113*a* which project from the arms 113 at an angle and are connected therewith and reinforced by struts 113*b*. If oil is supplied into the cylinder 124 through line 126 by means of the control valve 122, the piston 124*a* is forced out of the cylinder 124, the left-hand arm and the left-hand rear wheel 107 are swivelled downwardly so that the left-hand centre wheel 106 and the whole left-hand half of the vehicle is raised. If pressure oil is forced through line 127, the left-hand rear wheel 107 is returned to normal position, i.e. raised from the normal road position of the vehicle (Figure 18). The same applies to the right-hand half of the vehicle, depending on the movement of the control lever 123*a*.

Associated with the front wheels 105 are pressure cylinders 130 and 131. Their top ends are swivelled to a rigid frame portion 132 and 133 (Figure 20) while their lower ends are swivelled to the lower swivel arm 108 *via* hinges 134 so that they can follow the vertical swivelling motions of the front wheels. The pressure cylinders 130 and 131 are indirectly connected, *via* lines 135 and 136 and also *via* the left-hand control valve 122, with one oil pump 121. Furthermore, they are in direct communication with one another *via* the lines 135 and 136.

As shown in Figure 19, stop valves 137, 138 and 139 are so inserted in the hydraulic lines that the pressure cylinders of the left-hand half of the vehicle can be hydraulically disconnected from those of the right-hand half of the vehicle, the two rear cylinders from those in front, and the two front cylinders from one another. The control lever 122*a*, according to the diagram of Figure 19, controls the lowering motion of one or two rear wheels 107 and of one or both front wheels 105, depending on the position of the stop valves 137 and 138. The control lever 123*a* controls the raising motion of the rear wheels 107, while the two front wheels cannot be positively raised by hydraulic action. By adequate actuation of the stop valves 138, 139, they can, however, be immobilised in the extended, i.e. lowered position. It will be appreciated that, since the front wheels can be locked in the extended position and the rear wheels locked in any adjusted position, the sections can be locked in any of a range of adjusted relative angular positions. When all stop valves are opened and the control valves closed, all pressure cylinders communicate and form a joint hydraulic cushioning system for the wheel units since the whole oil volume inside them is constant. In addition, two central mechanical springs 140 and 141 (Figures 19 and 20) are provided, each of such springs being connected to the pressure lines for the reear and the front cylinders respectively *via* stop valves 142 and 143. When the valves 142 and 143 are open, the hydraulic plant therefore forms a communicating cushion by which the front and rear wheel units are resiliently supported by the mechanical pressure springs 140 and 141. It would also be possible to provide only a central mechanical suspension which is hydraulically connected to all four pressure cylinders.

It is thus possible, by means of the hydraulic plant described, to lower the front wheels individually or together and to move the rear wheels up or down individually or together. This possibility lends the vehicle an exceptional degree of cross-country mobility, even when under maximum service load. The vehicle may, as shown in Figures 21*a* and 21*b*, scale a vertical wall M of over 1 m. height, which has a small trench G in front of it. The vehicle backs up to the wall M with the rear wheels raised until they firmly rest against it. With the drive locked, the rear wheels 107 are forced downwardly, if necessary, as far as they will go, so that the position shown in Figure 21*b* is achieved. The vehicle then continues in reverse using the rear-wheel drive until the centre wheels 106 also engage the

wall. If necessary, the crew then move to the rearmost portion of the vehicle. The rear wheels 107 are next swivelled back into their normal position, i.e. the vehicle is swivelled up with the front wheels 105 into a position almost horizontal. This swivelling movement may, if necessary, be assisted by forcing the front wheels 105 downwardly. The vehicle can then continue to travel backwardly. Climbing down from the wall is performed by following the steps outlined in inverse order.

For prolonged travel along a slope H, the vehicle may be rotated about its longitudinal axis by actuating the two left or right-hand pressure cylinders until the inclination of the slope is at least approximately compensated as shown in Figure 22. The centre wheel 106 on the lower side will not touch the ground. The front-wheel cylinder on the lower side is blocked by means of the associated stop valve so that tilting is impossible even when the direction of travel is changed in a downhill direction.

If the vehicle becomes bogged down, one rear wheel 107 is first raised so that a plank may be placed beneath it and the same procedure is then followed for the other rear wheel. The two rear wheels are next forced downwardly so that the centre axle, which is under the greatest pressure, is thereby raised from the soft soil. The vehicle can then drive across the planks by means of the rear-wheel drive. The above are only the three most important cases of practical application of the construction of Figures 18 to 20.

In order to turn the vehicle in a very small turning circle one centre wheel 106 is braked or locked and the rear wheels 107 are raised slightly. The vehicle may now be turned about the point of contact D of the locked wheel with the ground as shown in Figure 23.

The frame of the vehicle may have its underside closed by a tub-like casing (not shown) extending between the wheels beneath the driver's seat, the differential gear 104 and the gear-box 111. This arrangement will protect the crew and the cargo if the vehicle travels across bogs or swamps. In order to improve the cross-country mobility of the vehicle still further, the centre wheels 106*a* in this embodiment may, as shown in Figure 24, also be equipped with an endless track 145 known *per se*, small auxiliary wheels or rollers 146 being provided. The centre and rear wheels may alternatively or in addition be connected by endless tracks 147 as shown in Figure 25. In this case the rotary drive in the swivel arms 113 may be dispensed with.

All the cross-country vehicles above-described possess the following advantages:—

a) The active swivelling movement of individual front and rear wheels in the wheel plane enables obstacles of all kinds and deep trenches with vertical walls to be overcome without difficulty.

b) Raising individual front and rear wheels and locking one or more centre wheels enables the vehicle to be turned in a very small turning circle, the radius of such circle being as low as one half of the length of the vehicle (cf. Figure 23).

c) The lateral stability of the vehicle is very high, despite the excellent cross-country mobility, due to the fact that the centre wheel axle is rigidly connected to the frame without springs so that no shifting of weight owing to the resilience of springs occurs.

d) Nonetheless certain embodiments (cf. Figure 22) can traverse slopes with the body of the vehicle in a horizontal position.

e) Good ground clearance may be achieved by raising the centre axle or axles. Thus crossing of a river may be effected with a raised engine.

f) Suitable locking of the hydraulic system enables it to be employed to cushion those front or rear wheels which rest on the ground when travelling on roads.

g) Additional control of the hydraulic plant enables the ground pressure to be distributed among the wheels as desired in accordance with any individual requirement.

h) No additional tools are required for raising of the wheels for changing tyres, applying tracks and the like.

The vehicle described therefore possesses cross-country mobility and versatility in use, particularly on difficult terrain, previously unknown. It is also excellently suited to military use, either as an ammunition carrier, troop-transport vehicle or, in particular, as a self-propelled mount for a small gun. The latter application is diagrammatically shown in Figure 26. Arranged on the vehicle so as to be rotatable about 360° is a gun 150, the barrel of which can be swivelled vertically about a small angle α. The vehicle 152 is so designed that the driver's seat 153 with the steering wheel and all control members is placed at the rear end to the side of the centre axis of the vehicle. The vehicle may be provided with twin centre wheels 106*b* or with endless tracks. As easily seen, inclination of the self-propelled mount about its transverse and/or longitudinal axis by means of the hydraulic plant (cf. Figure 22) enables such a gun to be fired, within a very short time, from a location where the ground is strongly inclined or very uneven, independently of the direction in which the ground is inclined relative to the direction of firing. Also it is possible to fire across a ridge by raising the centre of the self-propelled mount by lowering the rear wheels. In order to be able to fire upwardly or downwardly at greater angles, the self-propelled mount can be swivelled about its longitudinal axis by means of the hydraulic plant.

A further advantageous use of the invention may be achieved by designing the centre

wheels, e.g. of the embodiment of Figures 16 and 17, as railway wheels, With the front and rear wheels raised, the vehicle may then be employed as a rail vehicle, and with the centre wheels raised, as a road vehicle having steerable front wheels. Without any exterior aid the vehicle may, by way of example, move from a railway track to an adjacent road or area and hence continue its travel as a road vehicle.

WHAT I CLAIM IS:—

1. A motor driven vehicle comprising a wheeled front section and a wheeled rear section, such sections being so coupled to a horizontal wheeled axle arranged intermediate the section, or to a central section embodying at least one horizontal wheeled axle, that the angle between the longitudinal axes of the front and rear sections may be varied, and hydraulically operable means arranged to effect adjustment of the angular positions of the front and rear sections relatively to one another and to lock such sections in any of a range of adjusted relative angular positions or to allow them to be freely movable relatively to one another.

2. A motor driven vehicle comprising a central section which embodies at least one wheeled horizontal axle, wheeled front and rear sections each coupled to said central section for pivoting about a horizontal axis, and hydraulic means operatively connected to the front and rear sections and operable selectively and positively to adjust angularly the front and rear sections relatively to each other and to lock such sections in any desired adjusted position or to allow them to be freely movable.

3. A motor driven vehicle according to claim 1 or 2 and including a central section, wherein a hydraulic piston and cylinder system acts positively between the central section, or a part carried thereby, and one of the other sections.

4. A motor driven vehicle according to claim 3, wherein the said central section carries a chassis and body for the vehicle and the said hydraulic piston and cylinder system acts between the said chassis and the rear section of the vehicle.

5. A vehicle according to claim 1 or 2, wherein at least two hydraulic piston and cylinder systems, each spaced from the said horizontal axle, act positively on the front and rear sections so that the latter sections may assume, in relation to each other as seen in side elevation, a position resembling either an upright or an inverted V-shape, as desired.

6. A vehicle according to any of the preceding claims and including a central section having a single horizontal axle and the front and rear sections of the vehicle are pivotally interconnected by the said horizontal axle.

7. A vehicle according to claim 6, wherein each of the front and rear sections comprises a pair of arms carrying wheels at their ends, the pairs extending in opposite directions from the said horizontal axle, which carries wheels at its ends, and wherein the four arms are individually pivotable in vertical planes about the latter and are adjustable relatively to one another either individually or as said pairs by means of hydraulic control systems arranged in the interior of the vehicle.

8. A vehicle according to claim 7, wherein the end of each arm of at least one of said pairs of arms has pivoted to it a rocker carrying at least two wheels.

9. A vehicle according to claim 7 or 8, wherein all said wheels are driven, the wheels of the central section being driven directly from the said horizontal axle and the wheels of the front and rear sections being driven from said axle by power transmission means, such as chains, carried by said arms.

10. A vehicle according to any of claims 1 to 5 and including a central section having at least two horizontal axles, the front section of the vehicle being coupled to the central section so as to be angularly tiltable about a first horizontal axle thereof and the rear section being independently coupled to the central section so as to be independently angularly tiltable about a second horizontal axle thereof.

11. A vehicle according to any of the preceding claims, wherein the front section includes two wheels, one at each side of the vehicle, and each of such wheels has associated therewith a hydraulically adjustable piston and cylinder system which acts between said wheel and a chassis or frame, the two systems being arranged so that they may selectively be interconnected with each other to form a closed, free circulation, system or connected to a pump by means of a connecting conduit.

12. A vehicle according to any of the preceding claims, and including successive wheel groups interconnected by means of endless chains.

13. A vehicle according to any of the preceding claims, wherein the hydraulically operable means comprise piston and cylinder systems which may, by means of hydraulic control valves, selectively be individually or jointly shut off and connected to a pump or individually or jointly interconnected among themselves.

14. A vehicle according to any of the preceding claims, wherein the hydraulically operable means has associated therewith at least one resilient means for the cushioning of the vehicle, such means being compressible by hydraulic pressure.

15. A vehicle according to any of the preceding claims, wherein the said horizontal axle has at its ends wheels provided with an individual brake and the said front section has two wheels which are steerable.

16. A vehicle according to any one of the

preceding claims, wherein the front section has wheels projecting beyond the front of the vehicle to facilitate climbing of obstacles by the latter.

17. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 1 and 2 of the accompanying drawings.

18. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 3 and 4 of the accompanying drawings.

19. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 5, 6 and 7 of the accompanying drawings.

20. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 8, 9 and 10 of the accompanying drawings.

21. A vehicle substantially as hereinbefore described with reference to and as shown by Figure 11 of the accompanying drawings.

22. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 12 and 13 of the accompanying drawings.

23. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 14 and 15 of the accompanying drawings.

24. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 16 and 17 of the accompanying drawings.

25. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 18 to 23 of the accompanying drawings.

26. A vehicle substantially as hereinbefore described with reference to and as shown by Figure 24 of the accompanying drawings.

27. A vehicle substantially as hereinbefore described with reference to and as shown by Figure 25 of the accompanying drawings.

28. A vehicle substantially as hereinbefore described with reference to and as shown by Figure 26 of the accompanying drawings.

J. A. KEMP & CO.,
Chartered Patent Agents,
14, South Square, Gray's Inn, London, W.C.1.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1961.
Published by The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

Fig.1

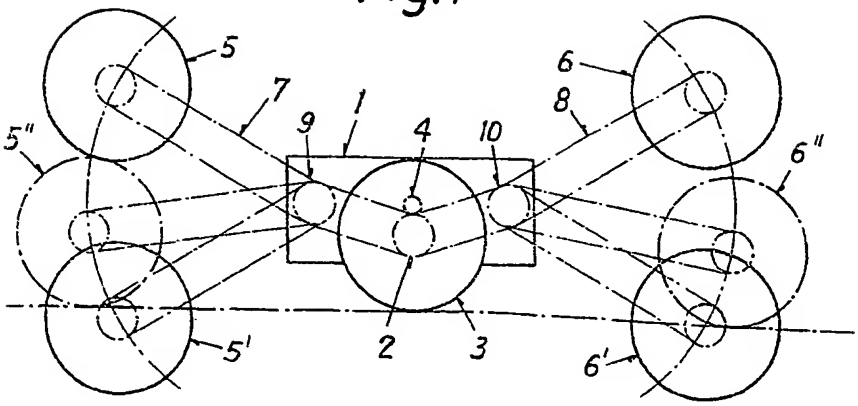
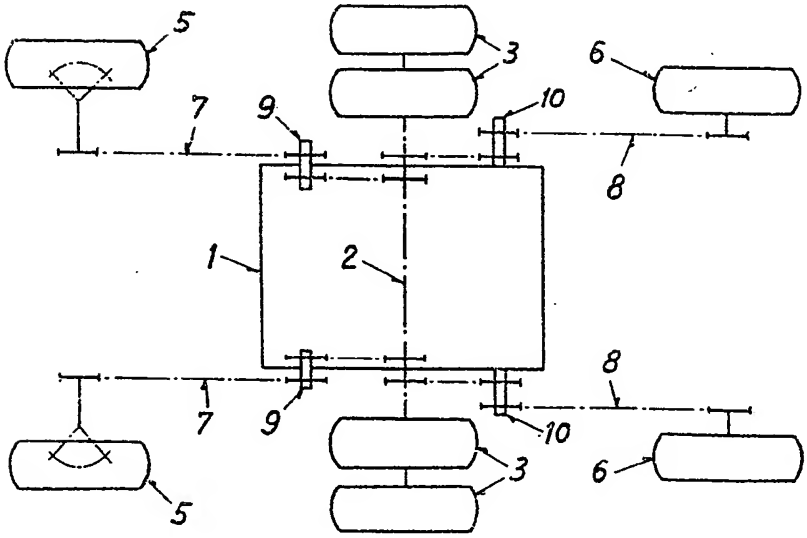


Fig.2



875,691 COMPLETE SPECIFICATION

10 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEETS 1 & 2

Fig.3

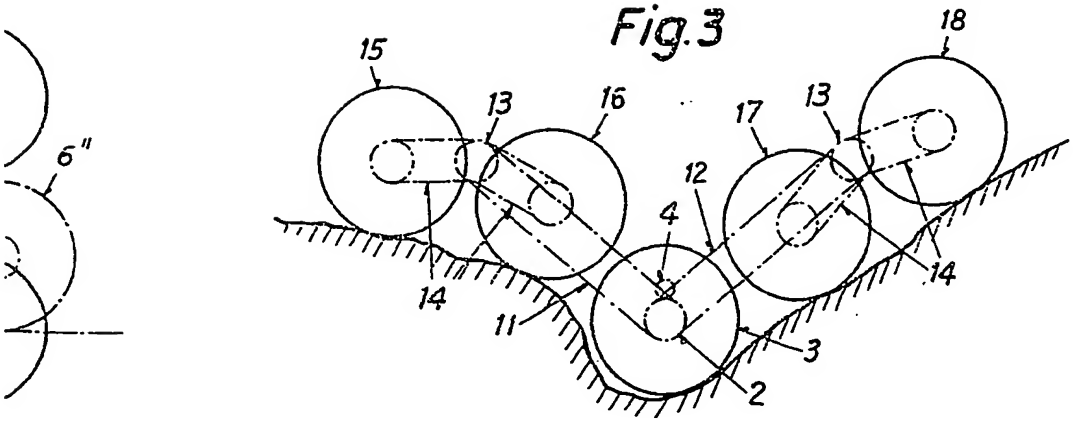
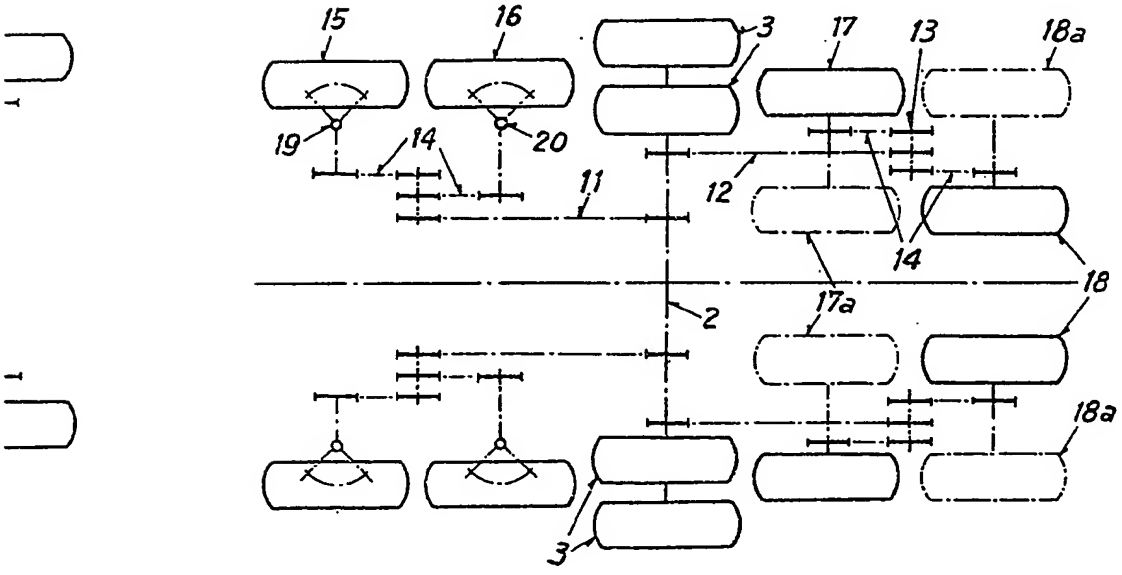


Fig.4



875,691 COMPLETE SPECIFICATION
10 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

Fig.1

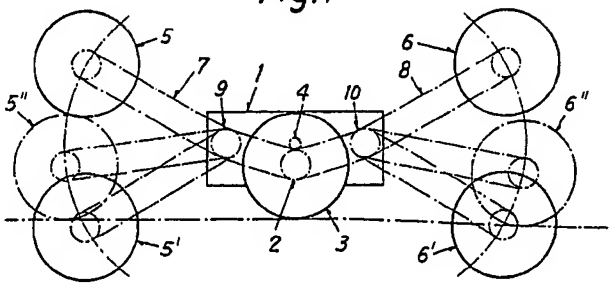


Fig.3

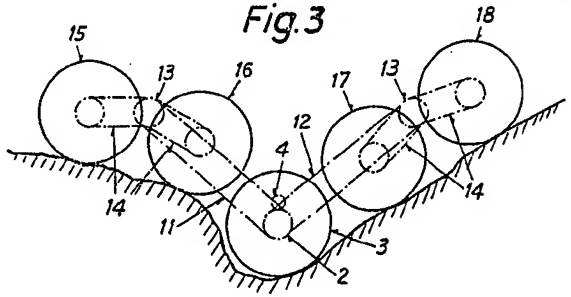


Fig.2

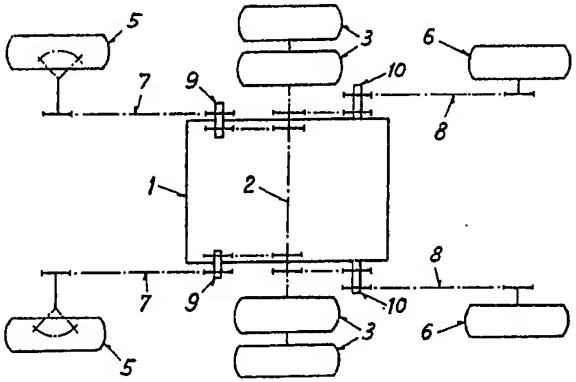


Fig.4

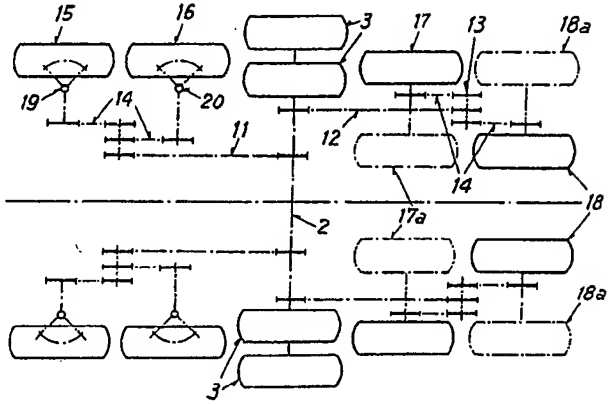


Fig.5

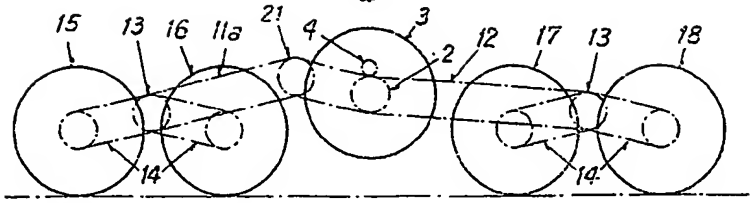


Fig.6

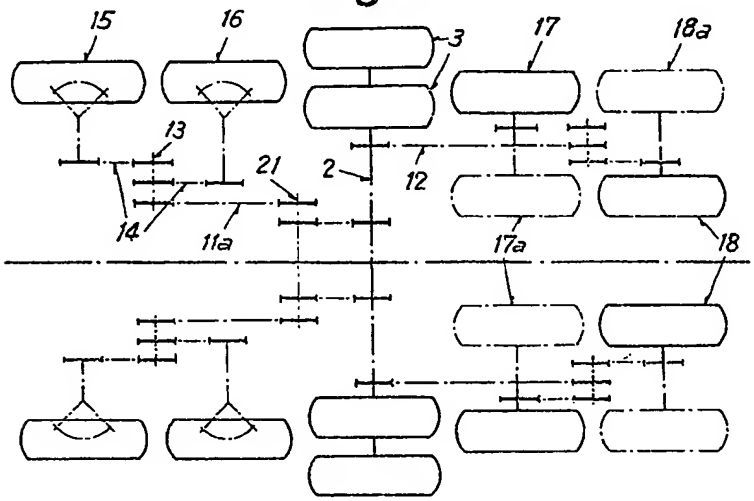
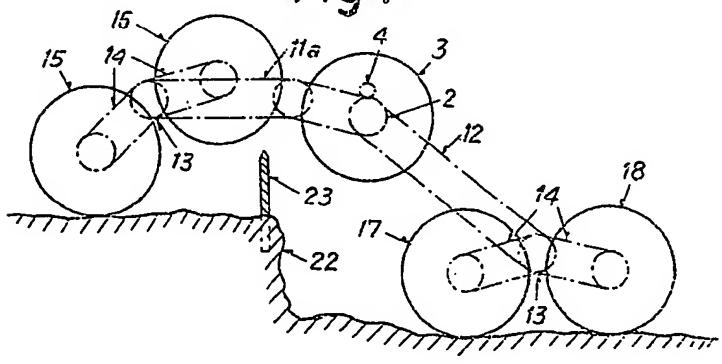


Fig.7



875,691 COMPLETE SPECIFICATION
10 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEETS 3 & 4

Fig. 8

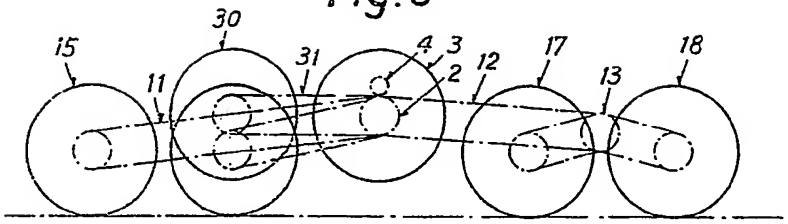


Fig. 9

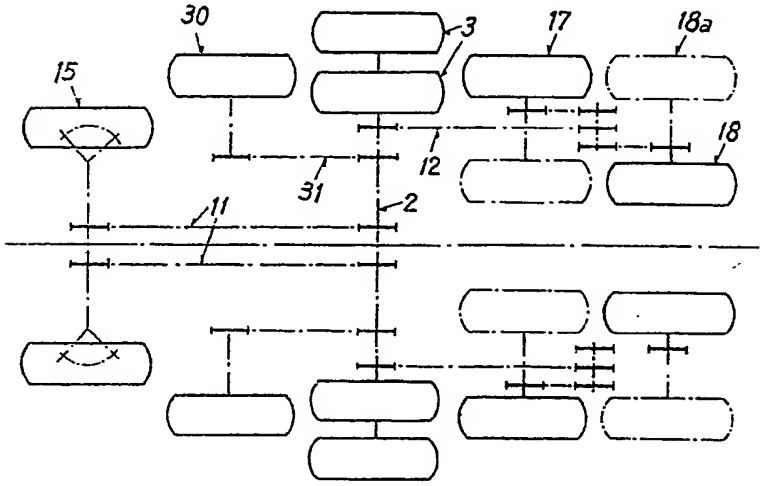
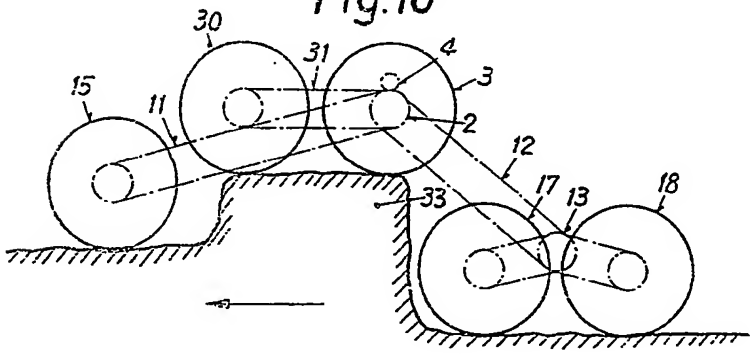


Fig. 10



875,691 COMPLETE SPECIFICATION
10 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 3 & 4

Fig.5

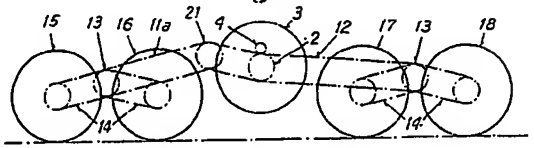


Fig.6

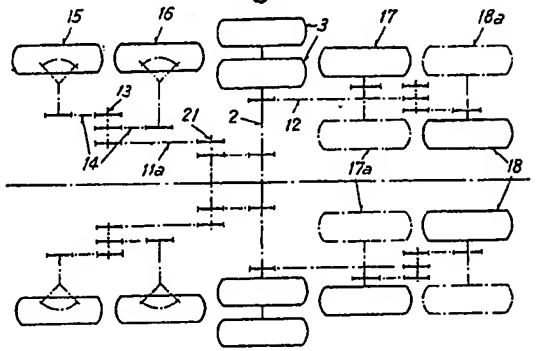


Fig.7

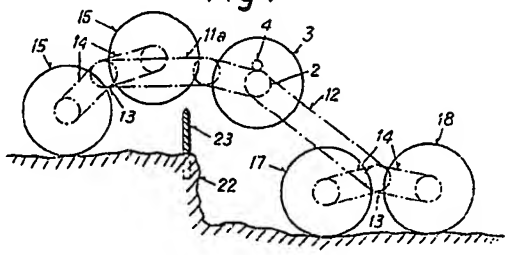


Fig.8

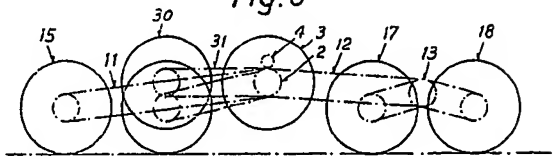


Fig.9

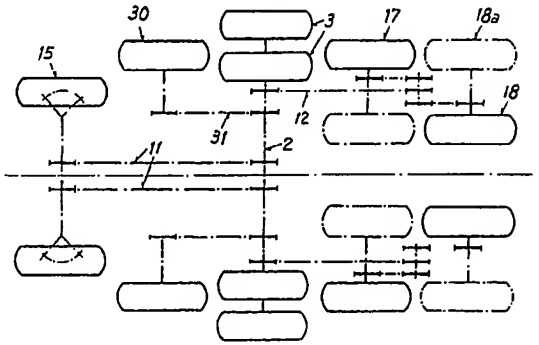


Fig.10

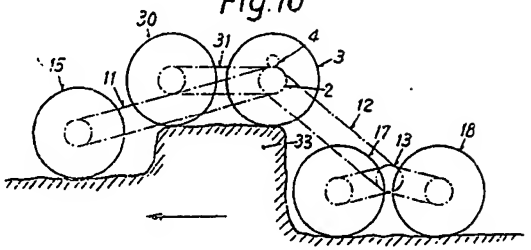


Fig.11

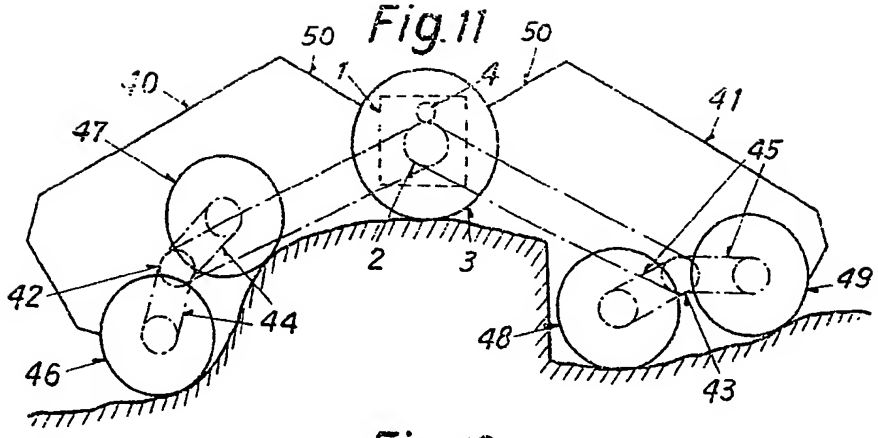


Fig.12

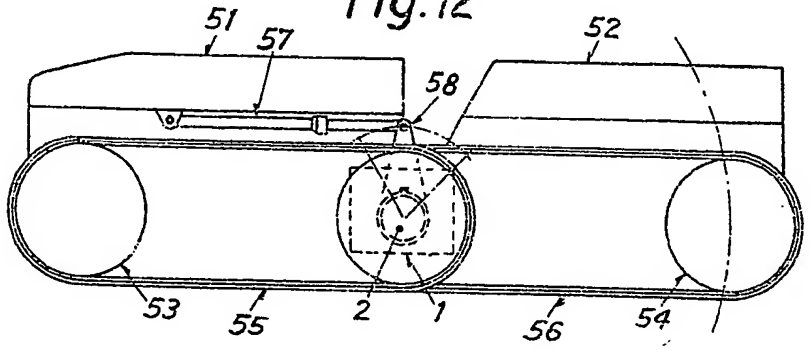
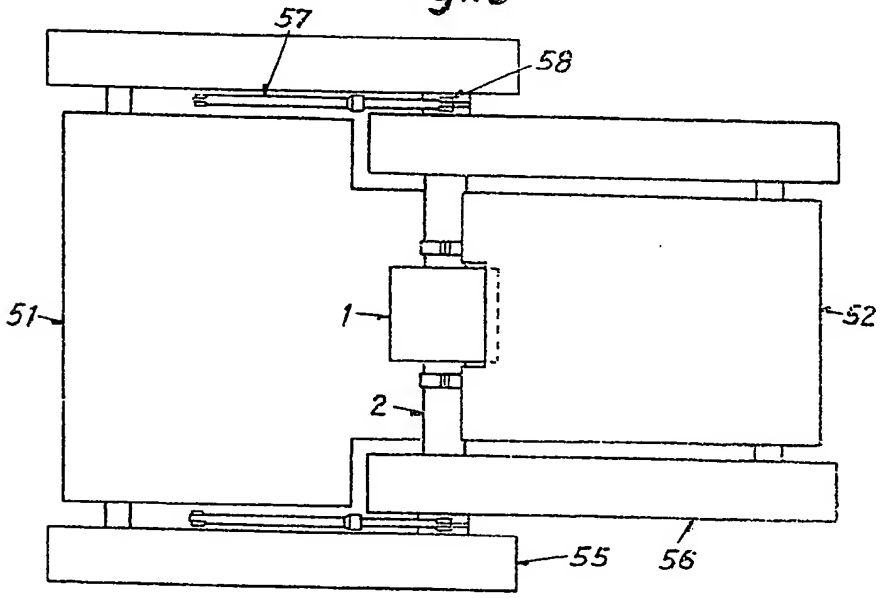
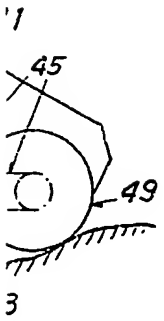
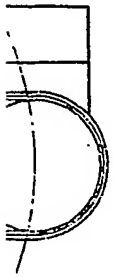


Fig.13



875,691 COMPLETE SPECIFICATION
10 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 5 & 6





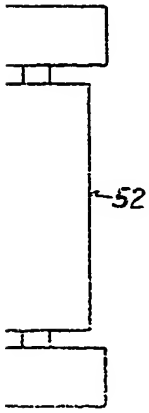


Fig. 14

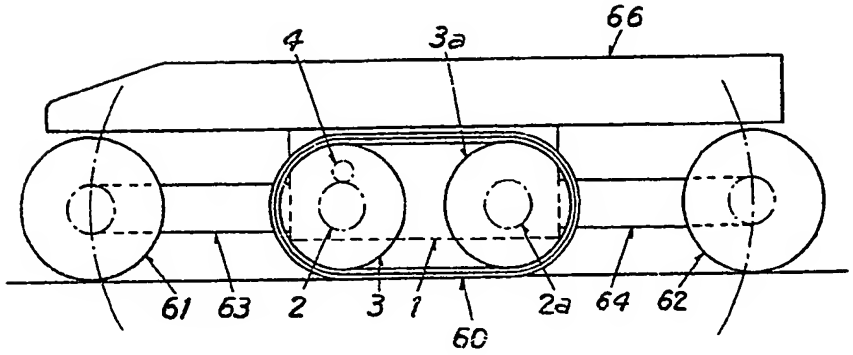
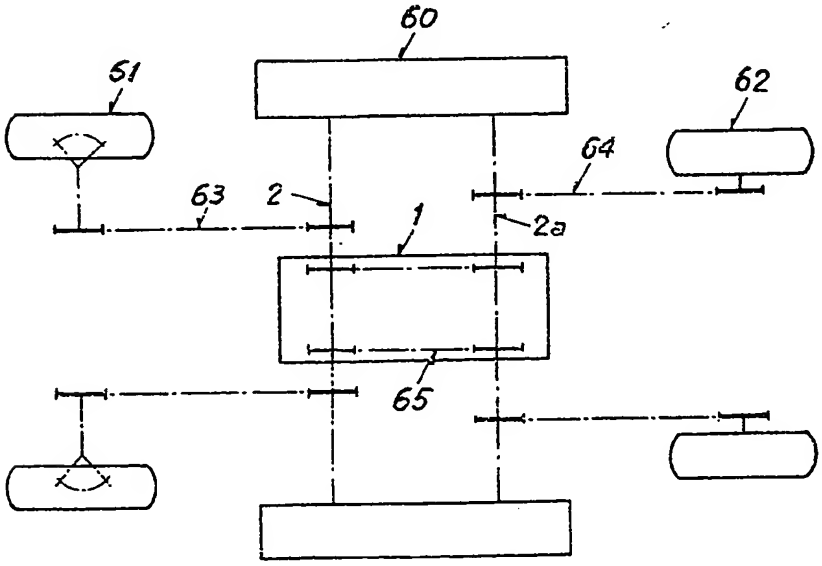


Fig. 15



875,691 COMPLETE SPECIFICATION
10 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 5 & 6

Fig.11

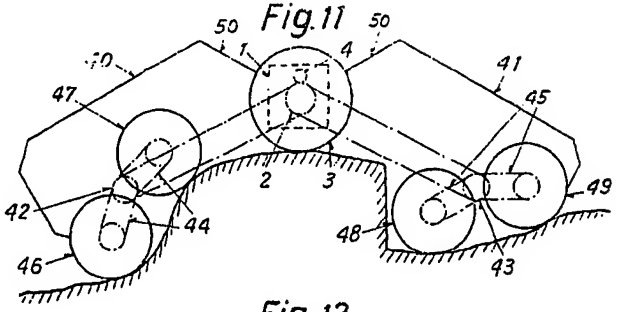


Fig.12

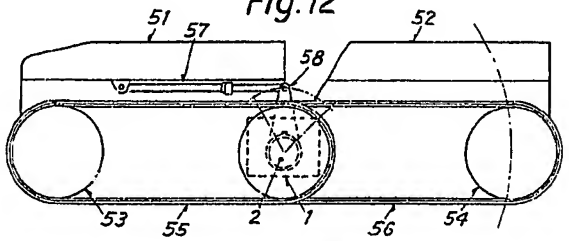


Fig.13

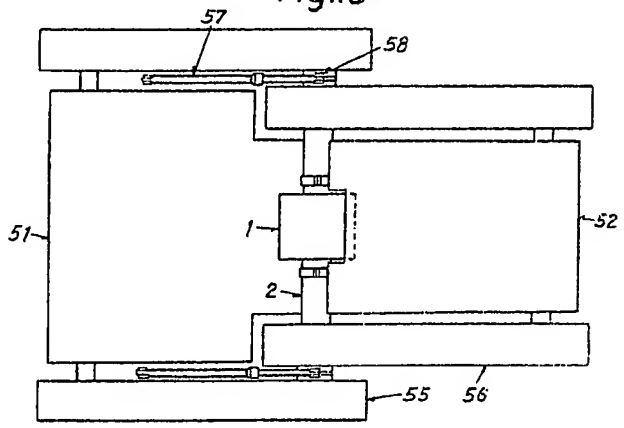


Fig.14

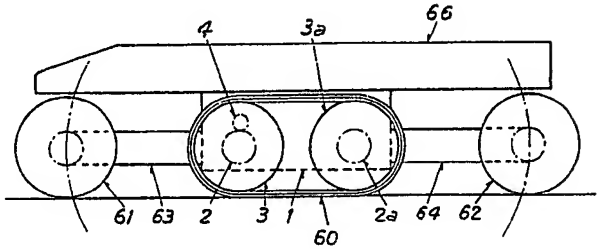


Fig.15

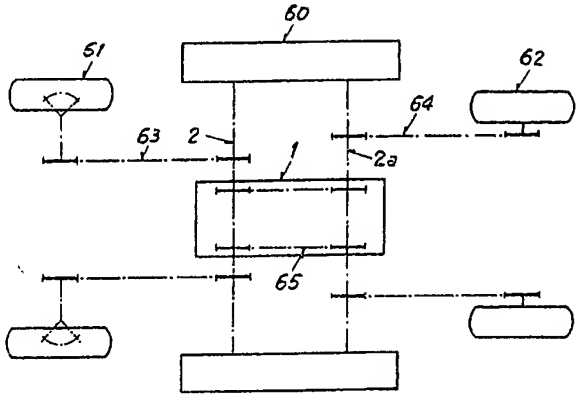


Fig.16

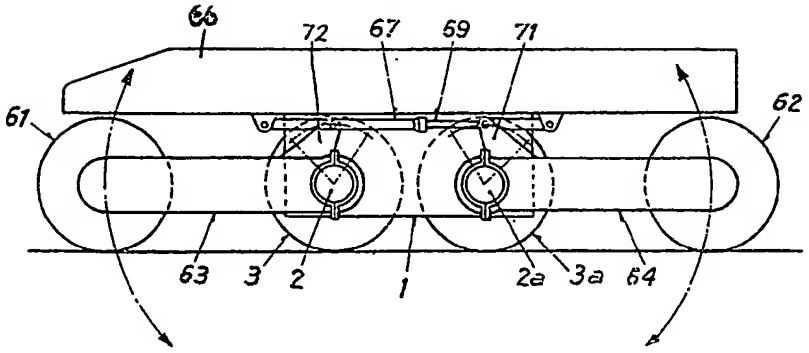
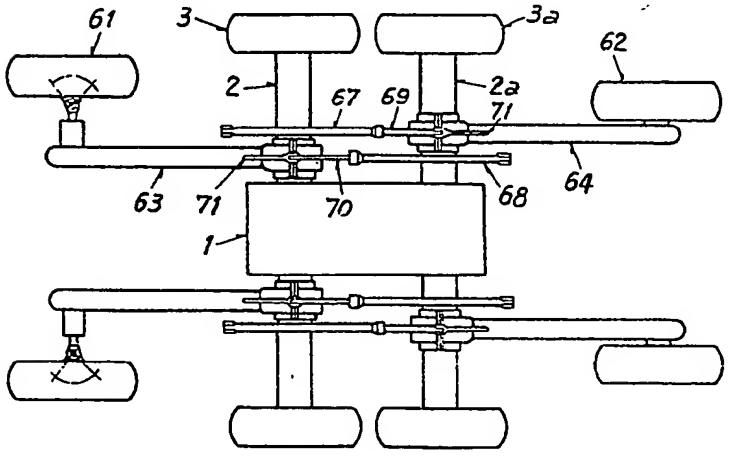


Fig.17



875,691 COMPLETE SPECIFICATION
10 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 7 & 8

Fig.18

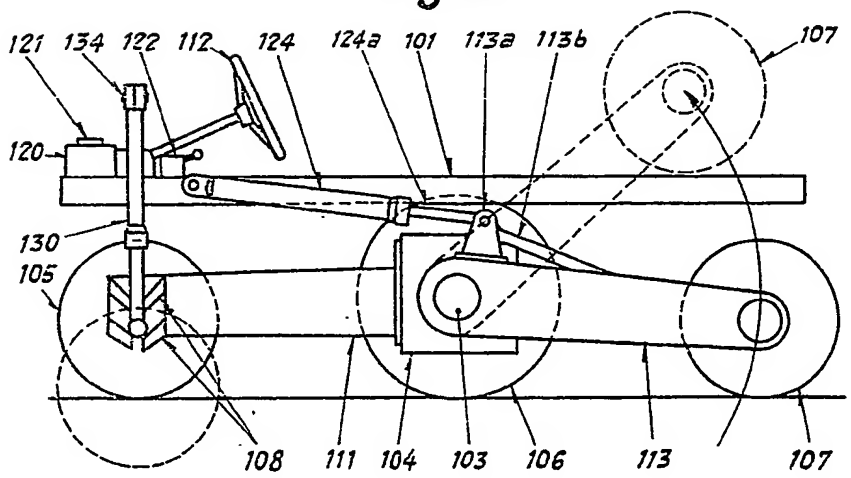
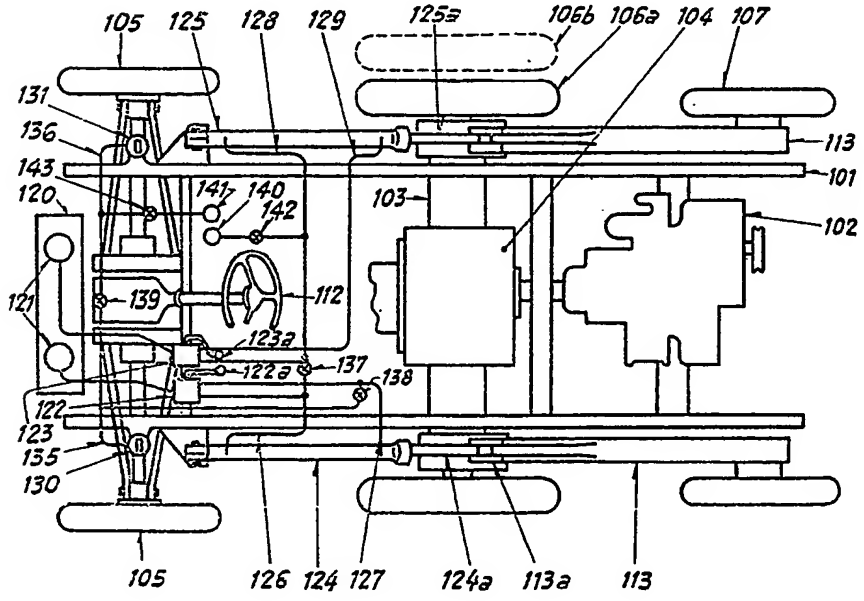


Fig.19



875,691 COMPLETE SPECIFICATION
10 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 7 & 8

Fig.16

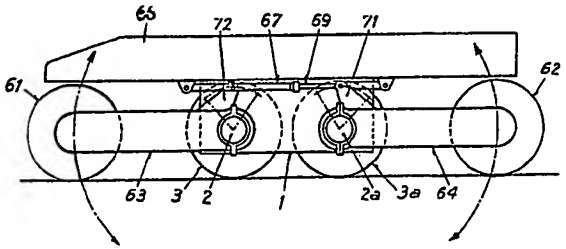


Fig.17

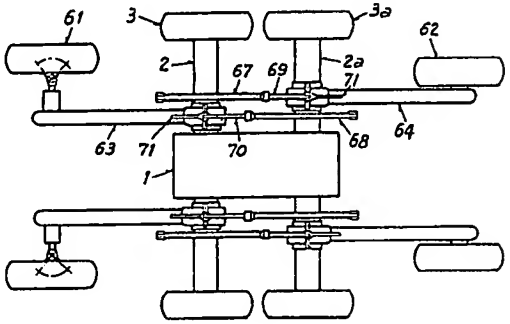


Fig.18

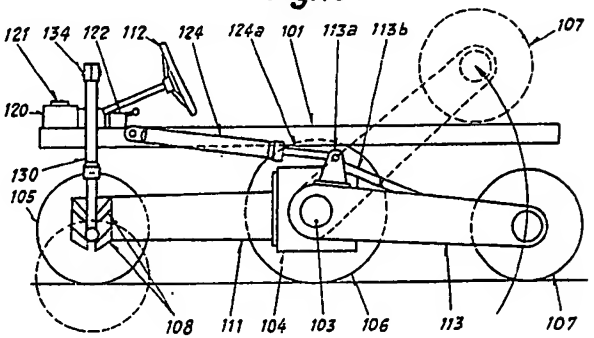


Fig.19

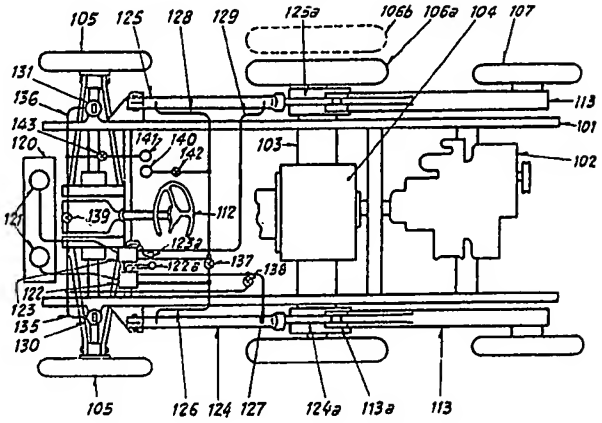


Fig.20

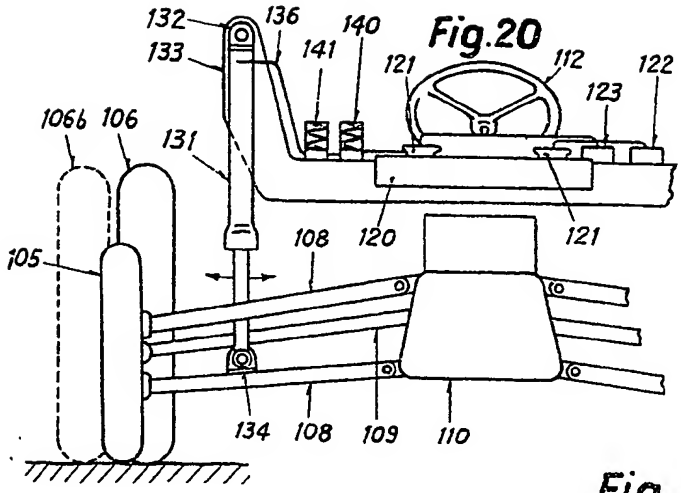


Fig. 21a

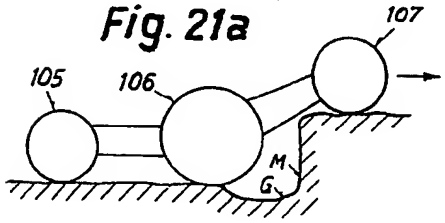


Fig. 21b

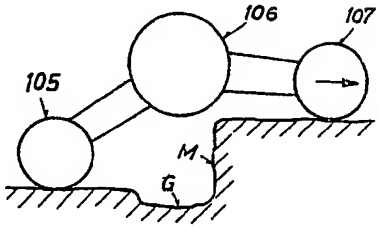


Fig. 22

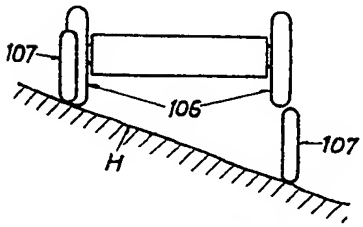


Fig. 23

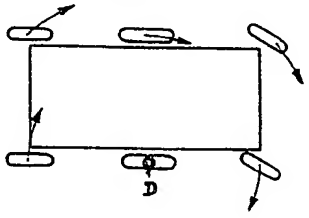


Fig. 24

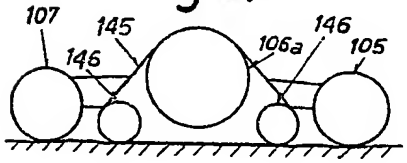
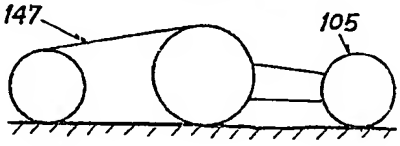


Fig. 25

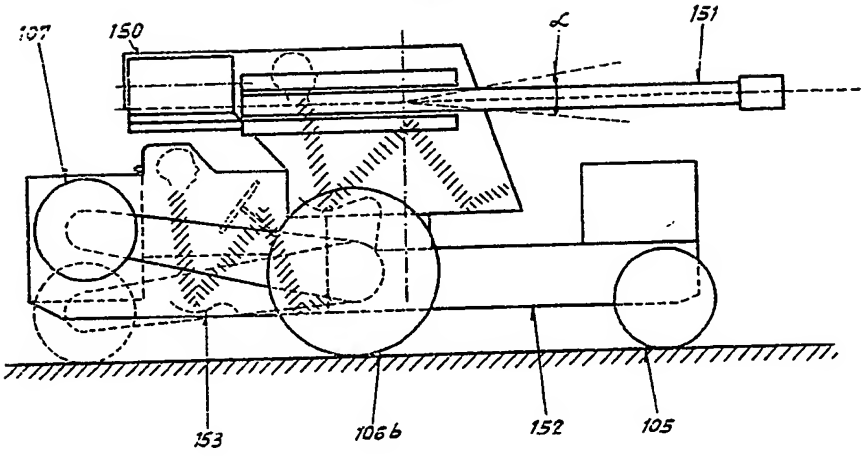


875,691 COMPLETE SPECIFICATION

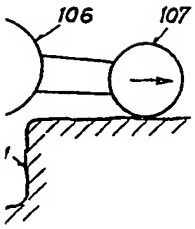
10 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*

SHEETS 9 & 10

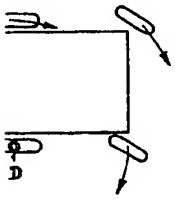
Fig. 26



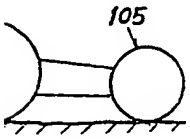
21b



1. 23



.25



875,691 COMPLETE SPECIFICATION
10 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 9 & 10

Fig.20

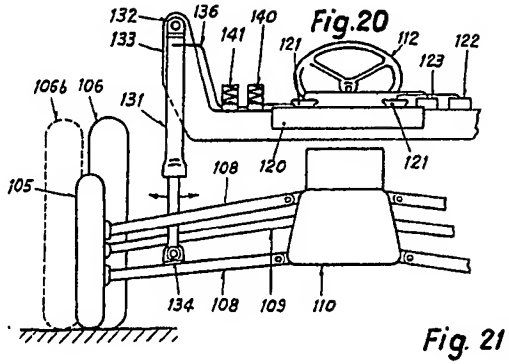


Fig. 21a

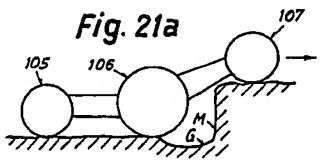


Fig. 21b

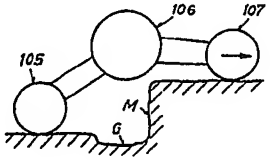


Fig.22

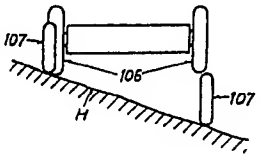


Fig. 23

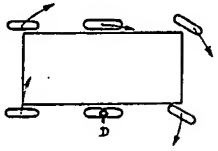


Fig.24

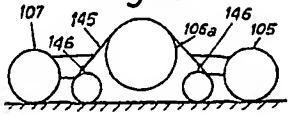


Fig.25

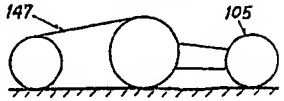


Fig. 26